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FRANCISCI WIL LUGHBEII *Armig.*
de Historia Piscium libri quatuor, Jussu & Sump-
tibus Societatis Regiæ Lond. editi. Totum
opus recognovit, coaptavit, supplevit, Librum
etiam primum & secundum integros adjecit J O-
 HANNES RAIUS *e Societate Regia,*
 Oxonii è Theatro Sheldoniano, 1686.

I need say no more concerning the publishing of this work, or those worthy Persons who have most contributed thereunto, then what is already contained in the Title, the Dedicatory Inscription, and the Preface; however I cannot omit that we ow much more, then is there intimated, to the indefatigable Industry of Mr *John Ray*, a Person of polite and incomparable Learning, and of a most exquisite Judgement, especially in the *History of Nature*.

The work is divided into 4 Books, the *first* treats of Fishes in Generall: the *second* of the *Cetaceous* or *Whale* kind: The *Third* of *Cartilagineous* Fishes, that have gristles instead of Bones: the *fourth* and last of those they call *Spinoſe* Fishes, that have small sharp bones in their Flesh; after which is annext a large Appendix.

In the first book are considered both the internall and externall parts of Fishes, as well those common to them, with other *Animals*, as those proper and peculiar to this kind; and the differences of the former, from those of like kind and denomination in Land *Animals* observed: The parts thus compared and consider'd, are the Eys, Mouth, Teeth, Tongue, Gills, Fins, Scales, Bristles, Beards, Lines: The Brains, the Stones found in their Heads, the swimming bladder, Gullet, Ventricle, Appendices,

pendices or Intestinula, Heart, Kidneys, Bladder, Anus, &c.

Next to the parts of Fishes and their uses, many things are sayd concerning their hearing, their respiration, their Motions, Generation, Food, Growth, Age, and their division, I will here only touch upon some particulars.

It is noted concerning the Eys of fishes, that they are flatter or more depressed then those of Quadrupeds, but the Chrystalline humour rounder, indeed either exactly Sphærical, or very near it. They want Ey-lids, and it is shewed that they are not necessary to them.

Concerning the hearing of fishes, it is remarked, that in no Fishes besides the Cetaceous kind, have hitherto been found any Auditory passages or Ear-holes, and whether they hear or no, is a question not yet fully decided, notwithstanding all the Experiments alledged to prove the Affirmative. For to that of calling the fishes together to meat in the Arch-Bishop of *Saltzburg's* Garden by the tolling of a Bell, it may be answered, that for ought is said in the Relation, the Bell might be hung in the Fishes sight; and so they observing the motion, not hearing the sound, might hasten to the place where it was made, in hope of a bait; just as did the Fishes observed by *S^t Augustine* in a certain Pool in the Territory of *Boll*, which having been used to be fed by Persons looking into the water, as soon as any man appeared walking on the brink, would presently swim up to them in Sholes, and attend them as they walked to and fro, in expectation of food. Howbeit this experiment might easily be improved to a demonstration, by placing the Bell behind a Curtain or Screen quite out of the Fishes sight; for if then upon ringing they make to the place whence the sound came, it will, necessarily follow that they can hear.

Concerning the Gills of Fishes it is shewn, that they
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are but as it were inverted Lungs, and are of the same use to Fishes as Lungs to Quadrupeds: that the whole mass of blood in every Circulation passes through the Gills, as in Quadrupeds it do's through the Lungs; only it returns not again to the heart, and therefore in Fishes as well the Vessels that carry it to the Gills, as those that bring it back, are Arteries. It is also proved, that fishes have a kind of respiration, as well as Land *Animals*, and that the use of the *Air* is as necessary to those as these; so that if it be intercluded, or made any ways unfit for life, they cannot live, as is clearly evidenced by great variety of undoubted experiments.

The fins serve not so much for progressive motion, as for holding the body erect, and for moving it to and fro, upwards and downwards in the water: the progression is performed principally by the motion of the Tail, by the sudden extension whereof being inflected, the Fish shoots it self forward with great force and Velocity.

Vid. Phil. Transf. N. 115.

The swimming-bladders found in most fishes, serve to bring the body to an *Æquilibrium* with the Element wherein it swims, that so it may with more facility be impelled or moved any way. That this is one use of it, is demonstrated from experience, for upon breaking the said Bladder, the fish is no longer able to support it self in the water, but presently sinks down, and constantly lies groveling at the bottom, from this *Air*-bladder there is a Channell or passage in most fishes, leading to the mouth of the Stomack, but in some few to the bottom of it, and there terminated: which probably serves for the emission and reception of *Air* at pleasure, to ballance the body according as either its gravity, or that of the Medium is altered. It is also probable that the fish hath a power of contracting and dilating this Vessel, either by some muscular force inherent in its Coats, or by the help of some externall

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adjacent or appendent muscles, to facilitate the ascent or descent of the body in the water, or to detain it in any depth of water.

The received opinion that fishes have neither Reins nor Bladder for Urine, is from experience contradicted, it being found by dissection, that few fishes want a bladder, none Reins.

The situation of the Appendices or blind-guts, is observed to be different in fishes from what it is in other *Animals*; for in these they are situated at the end of the Guts, at least of the small Guts; in those at the beginning next the Stomack. These Appendices in the severall species of fish, vary extreemly as to their number, figure and magnitude, as is declared in particular by severall Instances.

Next to the parts of fishes and their uses, many things are said concerning the generation of fishes, which is shewn to be threefold, according to the three cheif kinds of Fishes. For. 1. the *Cetaceous* kind (which are rightly called by the Latines *Belluæ Marinae*, *Sea-Beasts*) generate exactly after the manner of *Viviparous Quadrupeds*.

2. The *Cartilagineous* kind somewhat resemble Birds in their manner of Generation, for they breed large Eggs with distinction of Yolk and White, only they do not lay them, but cherish and hatch them in their Wombs, and so bring forth live young ones, as Vipers, and perhaps some other sorts of Serpents do.

3. The *Spinose* kind, (under which name are comprehended all other fishes beside the forementioned,) conceive an innumerable number of small Eggs called *Spawn*, which probably answer to the *Cicatrixulae* in Birds Eggs, and that (as is conceived) without any Coition or Copulation with the Male; on which Spawn, so soon as it is cast by the Female, the Male or *Milt* presently comes and scatters his *Milt* or Seed.

In the last place is delivered a generall division of fishes, not according to the place, (which method is for very good reasons rejected by M^r Ray,) but according to the Characteristick Notes of Nature.

As 1. Into the *Cetaceous* kind, which in most of their internall parts, the conformation of their brain, their manner of respiration and generation, agree exactly with *Viviparous Quadrupeds*.

2. The *Cartilagineous* kind, by which name are not to be understood all sorts of fishes that have gristles instead of Bones, but those which *Aristotle* calls *σφαγγίαι*, which are, (as he phrases it,) inwardly Oviparous, breeding great Eggs like to those of Birds, or rather Serpents, but outwardly *Viviparous*, laying and hatching those Eggs in their own bellys, and so bringing forth live young.

3. The *Spinose* kind, under which name are comprehended all fishes that are Oviparous, or cast their Spawn, indeed all besides those belonging to the two foregoing *genera*.

Those of the *Cetaceous* kind being but few, are not subdivided in this work.

The *Cartilagineous* kind are divided into those that are long and round bodyed, called *Sharks* and *Dogs*; and those that are flat and broad, which are again subdivided into Subordinate *Genera*.

The *Spinose* Fishes (which are the most numerous) are divided into. 1. the flat kind, which Swim lying on one side; as the *Sole*, *Plaise*, &c.

2. The *Anguilli-formes* or *Eel-like* fishes, that are long, slimy, and lubricous, having either no Scales or very small ones; many of which want the belly fins, or lower pair of fins; such are the *Conger*, *common Eel*, *Sea-Serpent*, *Eelpout*, &c.

3. Fishes of a shorter, more contracted, and thicker body, that want the second or lower pair of fins. Of

this kind are the *Globe-fishes*, either prickly or smooth; the *Triangular* and *Quadrangular* fishes, the *File-fishes*, *Hippocampi*, &c.

The rest of this kind, which have two pairs of fins, are divided according to the number and quality of their back-fins into

4. Such as have three fins on their backs, which are only those of the *Cod-kind*.

5. Such as have two fins on their back, and. 1. such as have them both with soft and flexile Ray's or Nerves. 2. Such as have the foremost with stiff and spinose Ray's, the hindmost with soft and flexile.

6. Such as have but one single fin on the back, and 1. such as have all the Rays of the sayd fin soft, flexile and nerveose. 2. Such as have the foremost ray's thereof stiff and spinose, the hindmost soft and flexile.

In the first Book is also exhibited a Catalogue of *English* fishes, as many as have come to the knowledge of the *Authours*; as well such as are found in Salt, as in Fresh Waters.

Note, that the two latter chief kinds of Fishes, *viz.* the *Cartilagineous* and *Spinose*, agree in their manner of respiration by Gills, and therefore in this Chapter the primary division of fishes, is into such as respire by the help of Lungs, and such as by the assistance of Gills, and these latter subdivided into *Cartilagineous* and *Spinose*. This may suffice for the first Book; the other three shall be run over in as few words as possible, we having laid down a generall Scheme of the whole.

The second book, which treats of *Cetaceous* fishes, gives first generall notes of this kind, 2^{dly}. particular Descriptions of the severall species, of which that of the *Porpefs* or *Phocæna* is our own; for these fishes are not frequently to be seen or procured.

In all the other Tribes of *European* fishes, there are very few, but what were seen by Mr *Willoughby* and

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Mr *Ray*, and their Descriptions taken from the fishes themselves, not transcribed out of books. As for the *Indian* Fishes, they are partly borrowed from the best *Authors*, who have travelled the *Indies*, partly from dried fishes found in *Museums*.

The 3^d book contains the *Cartilagineous* kind. These have Gills in common with the *Spinose* Tribe, but instead of single apertures have five oblong holes on each side. These all want Scales and the swimming bladder, have gristles instead of bones, as their name imports, have their mouths in the prone or under side of their bodys; the Males have two *Penis-like appendices* annexed to the fins encompassing the Vent, and generate as is before declared. Many of these fishes are very voracious, and of speedy concoction, as the *Sharks*; yet no Acid humour is to be perceived by tast in their Stomacks, of which there is a very memorable example.

The 4th Book, which comprehends all the *Spinose* and *Oviparous* fishes, is divided into many *Sections* or subalter-nate *genera*, the titles whereof are already enumerated.

In the 3^d of which Sections, which is concerning round or short bodied fishes, there is a great number never before published, exactly described and figured, the discovery and observation whereof is wholly owing to the Industry of the learned and ingenious Dr *Martin Lister*, who with great pains and diligence searched them out in the publick *Museums* and Cabinets about *London*. Possibly there might be found as great diversity's in some other kinds of fishes, had they been with the like diligence sought out by *Mariners* and *Fishermen*, who may think those of an uncouth shape, of a Crustaceous Skin, and disposition to dry, and keep without alteration of figure, to be the best merchandize for them; so that they may perhaps neglect and slight many other kinds.

In this Section is also an Account given of the man-

ner of taking the *Sword-Fish*, which is much like to the *Whale Fishing*. It is remarkable of this fish, that tho' for bigness it might be reckoned of the *Cetaceous* kind, yet is the flesh thereof of so delicate a tast, that the *Messanese*, and other Inhabitants of *Sicily* and *Italy*, whereabouts it is taken, are as fond of it as our people of *Mackrell*, or fresh *Herrings* at their first coming, so that it is sold for one *Tari* per pound, which is little less than six pence *English*.

In the 4th Section of this book, a particular and exact account is given of the severall sorts of fishes of the *Trout* or *Salmon* kind, and of the manner and whole process of their generation and mixtures, and of their fishing; as also of the *Tunny* fishing, which is so great advantage to the *French*, *Italians*, and other Nations bordering on the *Mediterranean* Sea. In the same Section is described the manner of the *Pilchard* and *Herring* fishing, as also the ways of curing them when taken, and of smoking and redding *Herrings*.

For other particulars of the book, and for the whole Appendix, the Reader is referred to the work it self.

But that which gives this work the greatest advantage above any other *History of Fishes* hitherto published, and recommends it to the purchase and perusal of all curious and ingenious persons, is the clear and accurate method, the many new Observations, the multitude and elegance of the *Sculpts*; in all which respects jointly taken, it far transcends any book of this nature already extant. The number of Copper Plates being little short of 200, in which are figured 388 fishes, besides 37 in the Appendix. The new figures designed from the life are 128, of which 30 at least of fishes never before exhibited or described, for which we ought to thank Dr *Lister*.

GODEFRIDI BIDLOO, M. D. *Anatomia Humani Corporis*. Amstel. Fol. 1685.

THIS Anatomy is perfectly *Demonstrative* or *Iconographical*, consisting of a hundred and five Tables of large and most Elegant Cutts, with Explications of them: the Draughts were taken by the curious *Gerard de Lairefs*, and are said to be all *Originalls*: the method observed is 1. of the *Head*, 2^{ly} of the *Breast*, 3^{ly} of the *Abdomen*, 4^{ly} of the *Womb*, as it is in Women great with Child, and of the *Fætus*, &c. 5^{ly} of the *Muscles* of the *Limbs*, 6^{ly} the *Osteology*. Tis a beautifull work, which without ingaging in controversies concerning the Uses of Parts, represents to the Ey the whole Anatomy of Man.
